

REMARKS/ARGUMENTS

Introduction:

Claims 19 and 38 are amended. Claims 19-58 remain pending in the application, although claims 31-33 are currently withdrawn. (Claims 1-18 were previously canceled.) Applicants respectfully request reexamination and reconsideration of the application.

Claims 19-37 and 51-54:

Claims 19-27, 34, and 51-55¹ were rejected under 35 USC 102(b) as anticipated by US Patent No. 3,952,404 to Matunami ("Matunami"), and claims 28-30 were rejected under 35 USC 103(a) as obvious in view of Matunami and US Patent No. 5,160,579 to Larson ("Larson"). In addition, claims 35-37 were rejected under 35 USC 103(a) as obvious in view of Matunami and US Patent No. 6,264,477 to Smith et al. ("Smith"). Applicants respectfully traverse these rejections.

Independent claim 19 describes the "interconnection element [as] having . . . a free end *extending over* a portion of [a] masking material," and claim 19 includes the step of "removing from the substrate and the interconnection element the portion of the masking material over which the free end of the interconnection element extends." In the Office Action, Matunami's beam leads, which consist of portions of metal film layers 20 and 18 as shown in Figure 15, were equated with the interconnection element of claim 19. As can be seen in Figure 15, however, no portion of Matunami's beam leads *extends over* any portion of a masking material (identified in the Office Action as portions of metal film layer 18 removed in the transition between Figures 14 and 15) that is later removed from both Matunami's substrate and beam leads. Indeed, because Matunami's beam leads include portions of metal film layer 18 (see Figure 15), it would be impossible for Matunami's beam leads to extend over any part of the portions of metal film layer 18 that are removed in the transition between Figures 14 and 15. For this reason alone, Matunami does not anticipate or render obvious claim 19.

Moreover, claim 19 includes the step of "*transforming a property* of one of the first element material and the second element material of the interconnection element *to modify the shape* of the interconnection element." In Matunami, the shape of the beam leads is changed by

¹ The inclusion of claim 55 in the rejection on the grounds of anticipation by Matunami appears to be an error because claim 55 depends from claim 38, which was not rejected as anticipated by Matunami.

bending metal films 18 and 20, which is accomplished by applying a physical force to the metal films 18 and 20 (Matunami col. 2, lines 32-35; col. 5, lines 49-51; and col. 6, lines 26-28)—not by transforming a property of metal film 18 or 20, as would be required to meet the requirements of claim 19.

Recognizing this deficiency in Matunami, the Office Action states that heating Matunami's beam leads inherently transforms properties of the beam leads. Claim 19, however, requires "transforming a property . . . *to modify the shape* of the interconnection element." There is no teaching or suggestion that Matunami's beam leads are heated sufficiently to modify the shape of the beam leads. Rather, as discussed above, Matunami expressly teaches that the shape of the beam leads is changed by applying a physical force to the beam leads. (Matunami col. 2, lines 32-35; col. 5, lines 49-51; and col. 6, lines 26-28.) Moreover, Matunami utilizes heat treatment to improve the bond between material 7 and pads 4 in Figure 4, and this heat treatment occurs before the beam leads are formed. (See Matunami col. 4, lines 5-22.)

Matunami thus fails to teach or suggest "*transforming a property* of one of the first element material and the second element material of the interconnection element *to modify the shape* of the interconnection element," as required by claim 19. For this additional reason, Matunami does not anticipate or render obvious claim 19.

Claims 20-37 and 51-54 depend from claim 19 and are therefore also patentable over Matunami, as neither Larson nor Smith make up for the above-discussed deficiencies in Matunami. Indeed, neither Larson nor Smith were relied on in the Office Action as teaching or suggesting the features of claim 19 discussed above as missing from Matunami. Moreover, claims 20-37 and 51-54 recite additional features not taught or suggested by Matunami, Larson, or Smith, whether taken individually or in combination.

For example, claim 22, which depends from claim 19, states "wherein transforming produces a volume change in one of the first element material and the second element material." Contrary to the assertion in the Office Action, there is no evidence or indication in Matunami that Matunami's ultrasonic vibrations change the volume of either of metal films 20 or 18. The prior art of record thus fails to anticipate or render obvious claim 22.

Claim 51 states that the transforming step recited in claim 19 "comprises applying a stimulus *to the interconnection element*." The Office Action equated Matunami's ultrasonic vibrations with the stimulus recited in claim 51. Matunami expressly teaches, however, that the

ultrasonic vibrations “are applied to the wafer” 1—not to the beam leads shown in Figures 15 and 16. (Matunami col. 7, lines 18-20.) Moreover, Matunami does not suggest applying the ultrasonic vibrations to Matunami’s beam leads, nor is there a reasonable expectation that applying the ultrasonic vibrations to the beams leads would cause the beam leads shown in Figure 15 to detach and bend into the positions shown in Figure 16. Therefore, claim 51 is independently patentable over Matunami.

Claim 52 states that “the first element material reacts differently to the stimulus than the second element material.” The Office Action does not identify a teaching or suggestion—and, indeed, there is no teaching or suggestion—in Matunami that the first metal film 18 and the second metal film 20 (which were equated in the Office Action with the first element material and the second element material of claim 19) react differently to Matunami’s ultrasonic vibrations (which was equated in the Office Action with the stimulus of claim 52). Claim 52 is therefore independently patentable over Matunami.

Claim 53 requires application of heat sufficient to trigger the transforming of a property that changes the shape of the interconnection element.² In rejecting claim 53, the PTO stated that the ultrasonic vibrations applied to Matunami’s wafer 1 necessarily generate heat. Nowhere, however, does Matunami teach or suggest, nor is it reasonable to suppose, that the ultrasonic vibrations applied to Matunami’s wafer 1 generate sufficient heat to change the shape of Matunami’s beam leads from what is shown in Figure 15 to what is shown in Figure 16. In fact, Matunami expressly teaches that the stimulus that triggers bending of Matunami’s beam leads is the ultrasonic vibrations—not heat. (Matunami col. 7, lines 18-22.) Claim 53 is therefore independently patentable over Matunami.

Claim 54 states that a stimulus causes “the first material element to expand at a first rate and the second element material to expand at a second rate that is different than the first rate, which causes the modifying of the shape of the interconnection element.” The Office Action does not identify a teaching or suggestion—and, indeed, there is no teaching or suggestion—in Matunami that Matunami’s first metal film 18 expands differently than the second metal film 20

² Claim 53 states that the “stimulus [applied to the interconnection element] comprises heat,” and claim 51 (claim 53 depends from claim 51) states that “the stimulus triggers the transforming of the property,” which claim 19 states modifies “the shape of the interconnection element.”

in response to the ultrasonic vibrations applied to wafer 1. (See Matunami col. 7, lines 18-22.)
Claim 54 is therefore independently patentable over Matunami.

Claims 38-50 and 55-58:

Claims 38-42, 44-50, 55, 57, and 58 were rejected under 35 USC 102(b) as anticipated by Smith, and claim 43 was rejected under 35 USC 103(a) as obvious in view of Smith. In addition, claim 56 was rejected as obvious in view of Smith and Matunami. Applicants respectfully traverse these rejections.

Independent claim 38 includes an "interconnection element" that comprises "a first part comprising a first element material and a second part structurally distinct from the first part and comprising a second element material different than the first element material." That the interconnection element comprises at least two different parts each formed of different materials is important because, as further stated in claim 38, the interconnection element is bent by "transforming a property of one of the first element material and the second element material." Nowhere does Smith teach bending an interconnection element that comprises two element materials. Rather, as shown in Figure 12, the spring contact 15 bent by Smith comprises only one material. (See generally Smith Figures 10-13 and col. 6, line 45 through col. 9, line 10.)

Applicants note that, contrary to the assertion in the Office Action regarding Figures 8 and 9 of Smith, Figure 7 of Smith illustrates nothing more than that "a strip of metal having no stress gradient inherent in the metal will lie flat" (Smith col. 5, lines 14-15), and Figure 8 of Smith illustrates nothing more than that "when the strip is bent into an arc, a uniform stress gradient . . . is introduced into the strip" (Smith col. 5, lines 16-17). Figure 9 of Smith shows nothing more than "a model for determining the amount of force F_{tip} applied by the spring contact tip 30 to a contact pad 3 in reaction to the force of the contact pad 3 pressing down on the spring contact tip." (Smith col. 6, lines 11-14)

Smith also states that the spring contact 15 can comprise a metal alloy, such as nickel-zirconium. By definition, however, an alloy is "A homogeneous mixture or solid solution of two or more metals, the atoms of one replacing or occupying interstitial positions between the atoms of the other: *Brass is an alloy of zinc and copper.*" (See Online dictionary "Dictionary.com.") A homogeneous mixture of metals does not constitute "a first part comprising a first element material and a second part structurally distinct from the first part and comprising a second

element material different than the first element material" as required by claim 38. Rather, a homogeneous mixture of metals must be considered one material element. For example, an object formed only of brass cannot be deemed to have "a first part comprising a first element material and a second part structurally distinct from the first part and comprising a second element material different than the first element material."

Claims 39-50 and 55-58 depend from claim 38 and are therefore also patentable over Smith. Moreover, claims 39-50 and 55-58 recite additional features not taught or suggested by Smith.

For example, claim 55 states that the transforming step of claim 38 "comprises applying a stimulus *to the interconnection element*." In the Office Action, etching Smith's insulating under layer 13 was equated with the stimulus of claim 55. Etching in Smith, however, is not applied to the spring contact 15 (which was equated with the interconnection element of claim 38) but to the insulating under layer 13. Claim 55 is therefore independently patentable over Smith.

Claim 56 states that "the first element material reacts differently to the stimulus than the second element material, which causes the modifying of the shape of the interconnection element." Nowhere does Smith or Matunami teach or suggest such a feature. Claim 56 is therefore independently patentable over Smith and Matunami.

Claim 57 states that the stimulus applied to the interconnect element comprises heat. In rejecting claim 57,³ the PTO acknowledged that Smith does not disclose heat as a stimulus to be applied to the spring contact 15. To make up for this deficiency in Smith, the PTO proposes replacing the step of etching the insulating under layer 13 with the step of applying ultrasonic vibrations, as disclosed in Matunami, to substrate 14 to release the free portion 11 of the spring contact 15.

The combination of Smith and Matunami, however, fails to render claim 57 obvious for at least two reasons. First, claim 57 requires applying heat—not ultrasonic vibrations—as a stimulus. Thus, even if the combination is made as proposed by the PTO, the combination does not apply heat as a stimulus and therefore does not meet the requirements of claim 57. Second, nothing in Smith implies problems with or drawbacks with freeing the free portion 11 of the

³ In the Office Action, claim 56 was rejected as obvious in view of Smith and Matunami, and claim 57 was rejected as anticipated by Smith. It would appear, however, that the PTO intended to reject claim 56 as anticipated by Smith and claim 57 as obvious in view of Smith and Matunami.

spring contact 15 by etching the insulating under layer 13. Similarly, nothing in Matunami teaches or suggests that applying ultrasonic vibrations provides any advantage or improvement over etching. Moreover, there is no indication that applying ultrasonic vibrations to Smith's substrate 14 would free the free portion 11 of the spring contact 15. Thus, not only is there no motivation to replace Smith's etching step with Matunami's ultrasonic vibrating step, there is not a reasonable expectation of success for such a replacement. Claim 57 is therefore independently patentable over Smith and Matunami.

Claim 58 states that a stimulus applied to the interconnection element "causes the first element material to expand at a first rate and the second element material to expand at a second rate that is different than the first rate, which causes the modifying of the shape of the interconnect element." Nothing in Smith teaches or suggests such features. Indeed, the Office Action does not identify any portion of Smith as teaching or suggesting such features. Claim 58 is thus independently patentable over Smith.

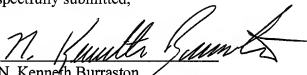
Conclusion:

In view of the foregoing, Applicants submit that all of the claims are allowable and the application is in condition for allowance. If the Examiner believes that a discussion with Applicants' attorney would be helpful, the Examiner is invited to contact the undersigned at (801) 323-5934.

Respectfully submitted,

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